No. 9500305

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Agripro Seeds, Inc.

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED, PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE ABOVE PURPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF [illegible]. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

'Norlander'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of Washington, D.C. this thirtieth day of January in the year of our Lord one thousand nine hundred and ninety-six.*

Attest:

Marsha A. Stanton

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

[illegible] of Agriculture

REPRODUCE LOCALLY. *Include form number and date on all reproductions.* FORM APPROVED - OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE DIVISION - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a).

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*
HybriTech US, a Monsanto Company
~~Agripro Seeds, Inc.~~
CGM 01 Jun 1998

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER
N90-0700

3. VARIETY NAME
Norlander

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
6700 Antioch
P.O. Box 2962
Shawnee Mission, Kansas 66201-1362

5. TELEPHONE *(include area code)*
913-384-4940 (KS)
970-532-3721 (CO)

6. FAX *(include area code)*
913-384-0208 (KS)
970-532-2035 (CO)

FOR OFFICIAL USE ONLY

PVPO NUMBER: 9500305

FILING DATE: Sept 8 1995

FEES RECEIVED
FILING AND EXAMINATION FEE: $ 2450.00
DATE: Sept 7, 1995
CERTIFICATION FEE: $ 300.00
DATE: Dec 26, 1995

7. GENUS AND SPECIES NAME
Triticum aestivum

8. FAMILY NAME *(Botanical)*
Gramineae

9. CROP KIND NAME *(Common name)*
Hard Red Spring Wheat

10. IF THE APPLICANT NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.) (Common name)*
Corporation

11. IF INCORPORATED, GIVE STATE OF INCORPORATION
Delaware

12. DATE OF INCORPORATION
June 1994

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS

~~Rob Bruns~~
~~806 N. Second Street~~
~~P.O. Box 30~~
~~Berthoud, CO 80513~~

OR

Christine Bruns
Berthoud, CO 80513

Mark J. Messmer
HybriTech US
5912 North Meridian
Wichita KS 67204

14. TELEPHONE *(include area code)*
316 755 7707
~~970-532-3721~~

15. FAX *(include area code)*
316 755 0072
~~970-532-2035~~

email:
Mark.J.Messmer@Monsanto.Com

16. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow instructions on reverse)*

a. [X] Exhibit A. Origin and Breeding History of the Variety
b. [X] Exhibit B. Statement of Distinctness
c. [X] Exhibit C. Objective Description of the Variety
d. [X] Exhibit D. Additional Description of the Variety
e. [X] Exhibit E. Statement of the Basis of the Applicant's Ownership
f. [X] Voucher Sample *(2,500 viable untreated seeds or, for tuber propagated varieties verification that tissue culture will be deposited and maintained in a public repository)*
g. [X] Filing and Examination Fee ($2,450), made payable to "Treasurer of the United States" *(Mail to PVPO)*

cgm
01 Jun 1998

17. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY, AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act)?*
[X] YES *(If "yes," answer items 18 and 19 below)* [ ] NO *(If "no," go to item 20)*

18. DOES THE APPLICANT SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
[X] YES [ ] NO

19. IF "YES" TO ITEM 18, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
[X] FOUNDATION [X] REGISTERED [X] CERTIFIED

20. HAS THE VARIETY OR A HYBRID PRODUCED FROM THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
[ ] YES *(If "yes," give names of countries and dates)* [X] NO

21. The applicant(s) declare that a viable sample of basic seed of the variety will be furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate.

The undersigned applicant(s) is(are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 41, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act.

Applicant(s) is(are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT *(Owner(s))*		SIGNATURE OF APPLICANT *(Owner(s))*	
NAME *(Please print or type)* Robert Bruns		NAME *(Please print or type)*	
CAPACITY OR TITLE Research Manager	DATE 8/30/95	CAPACITY OR TITLE	DATE

Exhibit A.
Origin and Breeding History of Norlander

Norlander originated from the cross between SD 2956 / ND 606 = (Prospect / Amidon) which was made at Berthoud, CO in the fall of 1987 and given the cross designation C88-0477. At the time of the cross, SD 2956 was a line from the South Dakota AES USDA-ARS wheat breeding program, which was released in 1988 under the name Prospect. ND 606 was a line from the North Dakota AES USDA-ARS wheat breeding program, which was released in 1988 under the name Amidon. The extended background of Norlander and it's parents is shown in the pedigree diagram below.

The cross C88-0477 produced 29 F_1 seeds. The F_1 generation was grown in the greenhouse in Berthoud, CO during the winter of 1987-88, harvested and planted as an F_2 population at Climax, MN in the spring of 1988. Selection criteria at this stage included; short to intermediate height, and resistance to leaf rust, stem rust, and other foliar diseases such as Tan Spot and Septoria Leaf Blight. Eighty-seven (87) single head selections were made from this F_2 population at Climax.

Single Seed Descent was used to advance these selections through the F_3 and F_4 generations in the Berthoud greenhouse during the fall and winter of 1988-89. Twenty-four (24) F_4 derived F_5 headrows from the C88-0477 cross were planted in 1989 at Borup, MN with selection criteria essentially the same as in the F_2 generation, although disease pressure was much less this year. (The reduced disease in this and subsequent cycles of selection may have contributed to Norlander's susceptible reactions to Tan Spot and Stem Rust.) A total of only four rows were selected from C88-0477 at this stage, with each row being harvested and bulked individually. The F_5 selection numbered 4836 was increased as an F_6 plot in a counter season nursery in New Zealand during 1989-1990 and subsequently entered into preliminary yield trials in the spring of 1990 under the line designation 'N90-0700'.

Norlander (N90-0700) was tested in AgriPro nurseries in the Red River Valley from 1990-1994. Norlander has also been tested in the Hard Red Spring Wheat Uniform Regional Nurseries in 1993 and 1994 and was entered in official state tests in North Dakota, South Dakota, and Minnesota during 1994.

In 1992, ninety-six (96) F_8 derived F_9 headrows were grown at Berthoud, CO and two rows were discarded for being slightly taller and one row was discarded for being slightly more blue in color. The remaining 93 rows were bulked and used to plant a 1.5 acre initial increase in 1993 which produced 5,790 pounds of breeder seed. An additional ninety-two (92) F_{10} head rows were planted in 1993, none of which were discarded, to serve as backup seed stock.

Norlander has been uniform and stable since 1993. Less than 0.8% of the plants were rogued from the breeder seed field in 1993. Approximately 75% of the rogued variant plants consisted of slightly taller (7 to 15 centimeters) wheat plants, 10% were awnletted wheat plants and 5% were bluer color wheat plants at boot stage. Up to 0.8% variant plants may be encountered in subsequent generations.

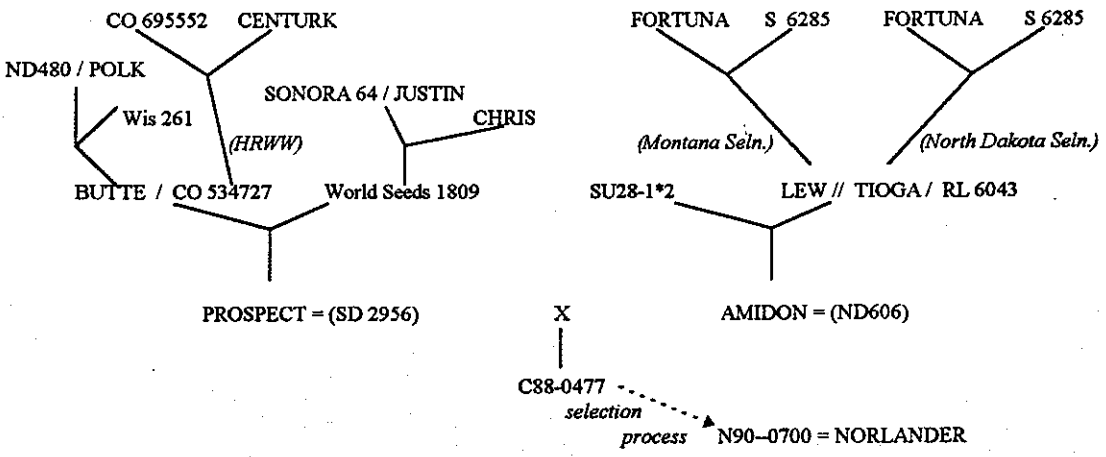

EXHIBIT B.

STATEMENT OF DISTINCTNESS

Norlander is most similar to the hard red spring wheat Prospect. However, it can be easily distinguished by the following morphological characteristics:

- Norlander has a square shoulder on its glume, (as recorded in Berthoud, CO 1992 thru 1994). Prospect has an elevated shoulder (Crop Science Registration 30:233-234; 1990).

- Norlander has angular cheeks on the seed, (as recorded in Berthoud, CO 1992 thru 1994). Prospect has rounded seed cheeks, (as recorded in Berthoud, CO 1993 & 1994).

- Norlander has collared seeds, (as recorded in Berthoud, CO 1992 thru 1994). Prospect does not exhibit collared seeds, (as recorded in Berthoud, CO 1993 & 1994).

U.S DEPARTMENT OFAGRICULTURE
AGRICULTURAL MARKETING SERVICE
COMMODITIES SCIENTIFIC SUPPORT DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(*Wheat*)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (*Triticum* Spp.)

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)
Agripro Seeds, Inc.

ADDRESS (*Street and No. or R.F.D. No., City, State, and Zip Code*)
6700 Antioch
P.O. Box 2962
Shawnee Mission, KS 66201-1362

FOR OFFICIAL USE ONLY

PVPO NUMBER 9500305

VARIETY NAME OR TEMPORARY DESIGNATION
Norlander

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in the first box (e.g. [ ][ ][ ] or [ ][ ]) when number is either 99 or less or 9 or less.

1. KIND:

[1] 1 = COMMON 2 = DURUM 3 = CLUB 4 = OTHER (SPECIFY)_____

2. VERNALIZATION:

[1] 1 = SPRING 2 = WINTER 3 = OTHER (SPECIFY)_____

3. COLEOPTILE ANTHOCYANIN:

[1] 1 = ABSENT 2 = PRESENT

4. JUVENILE PLANT GROWTH:

[3] 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

5. PLANT COLOR (boot stage):

[2] 1 = YELLOW-GREEN 2 = GREEN 3 = BLUE-GREEN

6. FLAG LEAF (boot stage):

[2] 1 = ERECT 2 = RECURVED

[2] 1 = NOT TWISTED 2 = TWISTED

7. EAR EMERGENCE: *Equal to Butte 86

[---][---] NUMBER OF DAYS EARLIER THAN _____*

[---][---] NUMBER OF DAYS LATER THAN _____*

8. ANTHER COLOR:

[1] 1 = YELLOW 2 = PURPLE

9. PLANT HEIGHT (from soil to top of head, excluding awns) 72 cm

[--][--] cm. TALLER THAN _____*

[0][7] cm. SHORTER THAN Bergen*

* Relative to a PVP-approved commercial variety grown in the same trial.

10. STEM:

A. ANTHOCYANIN

[1]

1 = ABSENT 2 = PRESENT

B. WAXY BLOOM

[2]

1 = ABSENT 2 = PRESENT

C. HAIRINESS (last internode of rachis)

[2]

1 = ABSENT 2 = PRESENT

D. INTERNODE (specify number) 4

[1]

1 = HOLLOW 2 = SEMI-SOLID 3 = SOLID

E. PEDUNCLE

[1]

1 = ERECT 2 = RECURVED

[1][7] cm

cm. PEDUNCLE LENGTH

11. HEAD (at Maturity):

A. DENSITY

[2]

1 = LAX 2 = MIDDENSE 3 = DENSE

B. SHAPE

[1]

1 = TAPERING 2= STRAP 3 = CLAVATE 4 = OTHER (specify) _____

C. CURVATURE

[1]

1 = ERECT 2 = INCLINED 3 = RECURVED

D. AWNEDNESS

[4]

1 = AWNLESS 2 = APICALLY AWNLETTED 3 = AWNLETTED 4 = AWNED

12. GLUMES (at Maturity):

A. COLOR

[3]

1 = WHITE 2 = TAN 3 = OTHER (specify) yellow

B. SHOULDER

[4]

1 = WANTING 2 = OBLIQUE 3 = ROUNDED 4 = SQUARE 5 = ELEVATED 6 = APICULATE

C. BEAK

[3]

1 = OBTUSE 2 = ACUTE 3 =ACUMINATE

D. LENGTH

[1]

1 = SHORT (ca. 7mm) 2 = MEDIUM (ca. 8mm) 3 = LONG (ca. 9mm)

E. WIDTH

[1]

1 = NARROW (ca. 3mm) 2 = MEDIUM (ca. 3.5mm) 3 = WIDE (ca. 4mm)

13. SEED:

A. SHAPE

[1] 1 = OVATE 2 = OVAL 3 = ELLIPTICAL

B. CHEEK

[2] 1 = ROUNDED 2 = ANGULAR

C. BRUSH

[2] 1 = SHORT 2 = MEDIUM 3 = LONG

[2] 1 = NOT COLLARED 2 = COLLARED

D. CREASE

[2] 1 = WIDTH 60% OR LESS OF KERNEL
2 = WIDTH 80% OR LESS OF KERNEL
3 = WIDTH NEARLY AS WIDE AS KERNEL

[2] 1 = DEPTH 20% OR LESS OF KERNEL
2 = DEPTH 35% OR LESS OF KERNEL
3 = DEPTH 50% OR LESS OF KERNEL

E. COLOR

[3] 1 = WHITE 2 = AMBER 3 = RED 4 = OTHER (specify) _____

F. TEXTURE

[1] 1 = HARD 2 = SOFT

G. PHENOL REACTION (see instructions)

[---] 1 = IVORY 2 = FAWN 3 = LIGHT BROWN
4 = DARK BROWN 5 = BLACK

14. DISEASE: (0 = NOT TESTED; 1 = SUSCEPTIBLE; 2 = RESISTANT) 3=Moderately resistant 4=Moderately Susceptible

[4] STEM RUST (Res. genes) _____

[3] LEAF RUST (Res. genes) _____

[0] STRIPE RUST (Res. genes) _____

[0] LOOSE SMUT (Res. genes) _____

[0] MILDEW (Res. genes) _____

[0] BUNT (Res. genes) _____

[0] *Septoria nodorum* (Res. genes) _____

[0] *Septoria tritici* (Res. genes) _____

[0] BYDV (Res. genes) _____

[0] WSMV (Res. genes) _____

[0] SBMV (Res. genes) _____

[0] SSMV (Res. genes) _____

[ ] OTHER _____

15. INSECT: (0 = NOT TESTED; 1 = SUSCEPTIBLE; 2 = RESISTANT)

[0] HESSIAN FLY (Res. genes) _____

[0] STEM SAWFLY (Res. genes) _____

[0] CEREAL LEAF BEETLE (Res. genes) _____

[0] APHIDS (Res. genes) _____

[0] GREENBUG (Res. genes) _____

[0] RUSSIAN APHID (Res. genes) _____

[ ] OTHER (specify) _____

EXHIBIT D.

ADDITIONAL DESCRIPTION OF NORLANDER

Norlander is a hard red spring wheat bred and developed by Agripro Seeds, Inc. It was derived from the cross SD2956/ND606. Norlander is a strong strawed, high yielding, medium height semidwarf wheat with early maturity. Norlander provides fair protection to leaf rust, but is moderately susceptible to stem rust. Milling properties are very good and baking characteristics are good.

Juvenile growth habit is erect. Plant color at boot stage is green. Flag leaf at boot stage is recurved with a twisted flag leaf. Head shape is tapering, awned and yellow at maturity. Glumes are glabrous, midlong and narrow with square shoulders and short acuminate beaks. Seed shape is ovate with angular cheeks.

Norlander is adapted to the entire northern hard red spring wheat region. Agripro Seeds, Inc. maintains seed stock and certified classes of foundation, registered and certified. Certified seed stocks of Norlander will be available in the spring of 1996.

EXHIBIT E.

STATEMENT OF THE BASIS OF APPLICANT'S OWNERSHIP

The variety for which Plant Variety Protection is hereby sought was developed by Joe Smith, an employee of Agripro Seeds, Inc. By agreement between employees and Agripro Seeds, Inc., all rights to any invention, discovery, or developement made by the employee while employed by Agripo Seeds, Inc., were assigned to Agripro Seeds, Inc., with no rights of any kind pertaining to 'Norlander' being retained by the employees.

EXHIBIT F.

QUALITY AND AGRONOMIC DATA

AGRIPRO WHEAT
HARD RED SPRING WHEAT
NORLANDER

YEAR: 1994

YEAR LOC	TEST WT	WHT PROT	FLR PROT	R	HRD	FLR YLD	R	ASH	MIXOGRAM PK TIME	MIXOGRAM PK HT	MIXOGRAM TOL	R	ABS	R	MIX TIME	R	LOAF VOL	R	CRUMB GR	CRUMB TX	CRUMB COL	OVER ALL	CO
	lb/Bu	14%mb	14%mb			%			min	N.U.	mm		%		min		cc		R	R	R	R	
									NORLANDER														
93 PR	54.8	14.2	13.1	4	70	71.6	6	.476	3.75	5.3	1412	2	66.0	4	3.75	1	1190	3	5	4	3	44	
93 GF	51.0	14.0	12.8	5	62	69.2	5	.498	4.00	5.0	1324	3	66.0	4	4.00	1	1040	6	4	3	3	46	
92 MW	57.6	14.4	13.0	3	114	73.8	4	.474	3.25	5.5	1317	3	63.0	3	3.25	1	820	3	5	4	3	41	
91 ST	60.4	15.5	14.2	3	87	72.9	5	.000	4.00	5.3	1411	3	66.0	3	4.00	1	1050	2	4	2	2	35	
90 TM	61.1	13.3	12.1	4	90	74.9	4	.000	3.50	5.3	1164	4	67.0	4	3.50	1	1000	5	3	3	2	42	
AVERAGE	57.0	14.3	13.0	3.8	85	72.5	4.8	.483	3.70	5.3	1326	3.0	65.6	3.6	3.70	1.0	1020	3.8	4.2	3.2	2.6	42	

FLOUR/WHEAT QUALITY

BAKING QUALITY

RATINGS: 1-2=EXCELLENT 3-4=GOOD 5=ACCEPTABLE 6-7=QUESTIONABLE 8-9=UNACCEPTABLE

Agripro Seeds
HARD RED SPRING WHEAT SUMMARY
OVER LOCATIONS-OVER YEARS

YEARS: 93
VARIETIES: NORLANDER BUTTE 86

AREA	YIELD Bu/Ac			T.WT. lb/Bu			HEAD DAYS			HEIGHT cm.			LODGE (1-9; 1=Best)		
86	LOCS	NORLAND	BUTTE86	LOCS	NORLAND	BUTTE86	LOCS	NORLAND	BUTTE86	LOCS	NORLAND	BUTTE86	LOCS	NORLAND	BUTTE
MN	3	33.7	32.8	3	54.0	56.2	3	63.7	63.7	3	80.7	87.7	3	2.7	3.7
MT	2	59.6	55.8	2	55.9	57.0	2	61.0	62.0	2	77.5	88.0	1	1.0	2.0
ND	8	39.9	43.7	7	54.1	56.3	8	60.5	60.3	5	79.8	92.0	4	1.3	1.8
SD	2	32.9	36.1	2	55.4	59.2	2	64.5	63.5	2	80.5	92.5	1	1.0	1.0
ALL	16	41.1	42.9	15	54.8	57.0	16	61.8	61.8	13	79.3	89.9	10	1.6	2.2

Agripro Seeds
HARD RED SPRING WHEAT SUMMARY
OVER LOCATIONS-OVER YEARS

YEARS: 93
VARIETIES: NORLANDER KULM

AREA	YIELD Bu/Ac LOCS	NORLAND	KULM	T.WT. lb/Bu LOCS	NORLAND	KULM	HEAD DAYS LOCS	NORLAND	KULM	HEIGHT cm. LOCS	NORLAND	KULM	LODGE (1-9; 1=Best) LOCS	NORLAND	KULM
MN	2	28.6	32.7	2	53.3	57.7	2	64.5	64.0	2	81.0	93.0	2	1.0	1.0
MT	2	59.6	56.7	2	55.9	58.8	2	61.0	61.5	2	77.5	90.5	1	1.0	3.0
ND	8	39.9	45.5	7	54.1	58.5	8	60.5	59.9	5	79.8	96.4	4	1.3	1.5
SD	2	32.9	33.3	2	55.4	57.9	2	64.5	64.0	2	80.5	96.5	1	1.0	1.0
ALL	15	40.9	44.0	14	54.8	58.5	15	61.8	61.5	12	79.3	93.6	9	1.1	1.4

Agripro Seeds
HARD RED SPRING WHEAT SUMMARY
OVER LOCATIONS-OVER YEARS

YEARS: 93
VARIETIES: NORLANDER STOA

AREA	YIELD Bu/Ac LOCS	NORLAND	STOA	T.WT. lb/Bu LOCS	NORLAND	STOA	HEAD DAYS LOCS	NORLAND	STOA	HEIGHT cm. LOCS	NORLAND	STOA	LODGE (1-9; 1=Best) LOCS	NORLAND	STOA
MN	3	33.7	32.8	3	54.0	55.3	3	63.7	67.3	3	80.7	97.3	3	2.7	3.7
MT	2	59.6	51.3	2	55.9	57.2	2	61.0	64.0	2	77.5	95.0	1	1.0	2.0
ND	8	39.9	42.9	7	54.1	55.9	8	60.5	62.1	5	79.8	98.0	4	1.3	1.8
SD	2	32.9	33.0	2	55.4	56.6	2	64.5	66.5	2	80.5	103.0	1	1.0	1.0
ALL	16	41.1	41.3	15	54.8	56.3	16	61.8	64.1	13	79.3	97.3	10	1.6	2.2

Table 4-4 UNIFORM REGIONAL NURSERY SCAB 1993 1993 - ST. PAUL
PLOT_SIZE_IN_SQFT: 8 DATE_SEEDED: 5/5/93 (Groth-Ozmon)

VARIETY OR STATE NO.	DIS %	SEV %	INC %
MARQUIS	36.1	38	96
CHRIS	10.8	20	56
ERA	26.7	28	97
STOA	9.7	14	69
BUTTE 86	6.8	13	55
SD8072	10.1	15	68
SD8073	12.4	18	65
SD8070	9.3	14	66
SD0005	13.8	20	67
SD0010	15.0	17	87
MN89103	8.2	11	73
MN90071	20.6	21	97
MN90114	21.4	21	100
MN90253	26.0	26	97
SBE0437	13.4	18	76
SBE0444	22.9	24	94
ND671	10.0	15	59
ND673	10.6	15	71
N 74	12.9	15	87
ND677*	21.6	26	82
ND678	10.4	16	67
XW398A4	48.0	48	100
N86-0348	28.4	29	99
N90-0666 Hamer	8.0	11	74
N90-0671 Lars	14.0	18	79
N90-0700Norland	18.4	21	85
N88-3140	22.5	23	98
MT8849	35.1	38	92
BW152	13.0	18	69
8601AE3C*	35.3	36	99
BZ 988-351	18.1	22	78
BZ 984-334	30.0	30	100
WHEATON	18.0	20	93
CHRIS	11.1	17	62
MARSHALL	9.7	12	81
SUMI	0.2	6	2
MEANS:	17.7	21	79

TESTS	DIS	SEV	INC
F-test:	16.5	14.5	13.6
L :	7.1	6.5	15.0
C	24.4	19.1	11.6

Table 4-2 Adult leaf rust reactions of entries in the 1993 Uniform Regional Hard Red Spring Wheat Nursery. [USDA-ARS, NDSU (Miller-Rasmussen)].

Entry Number	Cultivar or Line	Percent Severity and Reaction†			C.I.
		Fargo	Carrington	Langdon	
1	Marquis	70S	60S	20S	50.0
2	Chris	30S-10MS-5MR	20R-10MR-5MS	5R	17.7
3	Era	20MS-10MR	15R-tMR	20R	9.1
4	Stoa	10R-tMR	10R	10R	2.1
5	Butte 86	15R-5MR	10R-tMR	5R-tMR	2.8
6	SD 8072	10R	5R	5R-tMR	1.4
7	SD 8073	5R-tMR	10R-tMR	5R	1.5
8	SD 8070	10R	5R-tMR	5MS-tMR	2.5
9	SD 0005	20R-tMR	15R	20R-tMR	3.8
10	SD 0010	20R-5MR	10R-tMR	5R-tMR	3.1
11	MN 89103	40R	10R-tMR	20R	4.7
12	MN 90071	20R-5MR	10R-tMS-tMR	20R-tMS-tMR	4.4
13	MN 90114	20R-tMR	10R-5MR	10R	3.4
14	MN 90253	30R-tMR	10R-tMR	10R-tMR	3.5
15	SBE 0437	30R	20R	20R-5MR	5.3
16	SBE 0440	30R	10R-tMR	15R-5MR	4.4
17	ND 671	15R-tMR	5MS-tS	15R-tMR	3.6
18	ND 673	40R-10MR	15R-tMR	10R-tMS-tMR	5.9
19	ND 674	20R-tMR	10R-tMR	20R-5MR	4.1
20	ND 677	30R-5MR	15R-tMR	20R	5.1
21	ND 678	30R-tMR	10R-5MR	15R-tMR	4.5
22	XW 398A4	30R-tMR	5R-tMR	10R	3.1
23	N86-0348	20R-5MR	5R-tMR	10R	3.1
24	N90-0666 Hamer	30R-5MR	10R-tMR	15R-tMS-tMR	4.6
25	N90-0671 Lars	30R-10MR	10R-5MR-tMS	20R	6.1
26	N90-0700 Norlander	20R-tMR	20R	15R	3.7
27	N88-3140	20R-5MR	10R-tMR	10R-tMR	3.5
28	MT 8849	20R-10MS-10MR-tS	20S-5MS	5R-tMS-tMR	14.0
29	BW 152	15R	15R	5R	2.3
30	8601AE 3C	20R-tMR	20MS-5S-tMR	5MS-5R-tS	10.3
31	BZ 988-351	30R-tMR	30R-tMS-tMR	20S-10MS	13.6
32	BZ 984-334	20R-tMR	10R-tMS-tMR	15R-tMR	3.3

Date of Planting - Fargo 5/12/93, Carrington 5/5/93, Langdon 5/6/93.

†Dash - Range in reaction of each plant. Range in severity between plant but same reaction class.
Comma - Separation of plants into two or more reaction classes (segregation or seed mixture).
Natural Inoculum - Readings were made on flag and flag minus one at milk to mid-dough stage.
C.I. - Average Coefficient of Infection. Percent severity multiplied by the following values for reaction types: R = 0.2, MR = 0.4, MS = 0.8, S = 1.0, t = 0.5. Multiplication carried out for each reporting station and then an average is taken across stations.
1993 - Plants and rust evaluations were prime at all locations.

Table 4-1 Adult stem rust reactions of entries in the 1993 Uniform Regional Hard Red Spring Wheat Nursery. [USDA-ARS, NDSU (Miller-Rasmussen)].

Entry Number	Cultivar or Line	Percent Severity and Reaction*		
		Fargo	Carrington	Langdon
1	Marquis	10-40M	10-20M	t-10MSS
2	Chris	0,25M	0	0
3	Era	0	0	0
4	Stoa	0	0	0
5	Butte 86	tR*	0	0
6	SD 8072	5R*	0	0
7	SD 8073	0	0	0
8	SD 8070	10-25RMR	0	t-20R*
9	SD 0005	0	0	0
10	SD 0010	tR*	0	0
11	MN 89103	tR*	0	0
12	MN 90071	0	0	0
13	MN 90114	0	0	0
14	MN 90253	tR*	0	0
15	SBE 0437	0	0	0
16	SBE 0444	0	0	0
17	ND 671	0	0	0
18	ND 673	5RMR	0	5R
19	ND 674	5R	0	tR
20	ND 677	0	0	0
21	ND 678	0	0	0
22	XW 398A4	0	0	0
23	N86-0348	0	0	0
24	N90-0666 (Hamer)	5MRR	0	0
25	N90-0671 (Lars)	5-15M	0	0
26	N90-0700 (Norlander)	20M	0	0
27	N88-3140	0	0	0
28	MT 8849	40-50MSS	20-25MS	25MRMS
29	BW 152	0	0	0
30	8601AE 3C	0	0	0
31	BZ 988-351	20RMR	0	0
32	BZ 984-334	15RMR	0	0-20R*

Date of Planting - Fargo 5/12/93, Carrington 5/5/93, Langdon 5/6/93.

†Natural inoculum - plus additional inoculations of races CRL-15TLM, -15TNMK, -113RTQ, -151QFB and -151QSH at Fargo.

Reading - made at dough stage.

Comma - separation of plants into two or more reaction classes (segregation or seed mixture).

Dash - Range in severity between plants with same reaction

*Infection only on peduncle.

Hyperparasites and toxin produced by *Helminthosporium sativum* may have contributed to the reduced spread and severity of stem rust at these three locations.

1994 AgriPro Seeds Standard Variety - Agronomic Results

Variety	Yield (Bu./Acre)					Test Weight (Lbs. / Bu.)			NIR - Grain Protein (% Protein)			Heading (1 Early 9 Late)			Height & Lodging				Foliar Disease			Fusarium Head Blight				
															Ht.	Lodging						Visual	Wt. % Scab			lowest-best
	91	92	93	94	Ave.	91-93	94	Ave.	91-93	94	Ave.	93	94	Ave.	Ave.	91-93	94	Ave.	93	94	Ave.	94	93	94	Ave.	Index
LARS	55.9	82.1	45.8	49.1	58.2	54.9	55.4	55.2	13.5	14.4	14.0	5.8	6.4	6.1	3.6	1.4	2.0	1.7	2.8	2.7	2.7	3.8	11	25	18	25
HAMER	54.5	72.9	42.6	46.8	54.2	55.3	57.2	56.2	14.3	14.8	14.6	4.8	4.5	4.7	5.7	3.0	4.0	3.5	3.1	4.2	3.6	4.2	7	12	10	13
NORLANDER	52.9	77.1	42.2	43.4	53.9	54.5	56.6	55.6	14.5	14.8	14.7	3.1	3.1	3.1	4.7	1.0	5.0	3.0	5.4	6.3	5.9	4.3	8	24	16	30
2370	48.2	69.9	45.3	47.8	52.8	55.8	58.0	56.9	14.2	15.4	14.8	4.0	4.3	4.2	5.5	2.5	6.0	4.3	4.4	3.5	4.0	5.3	11	15	13	19
2375	52.7	83.9	45.3	48.1	52.5	57.3	58.1	57.7	14.1	14.8	14.4	3.3	3.3	3.3	6.2	2.6	7.0	4.8	5.8	5.5	5.7	3.7	5	11	8	10
NORDIC	46.2	76.0	41.3	44.7	52.1	56.3	56.1	56.2	12.7	13.8	13.3	6.1	6.1	6.1	5.9	2.3	5.0	3.7	4.2	5.7	4.9	3.3	10	15	13	16
STOA	46.3	65.1	45.0	44.6	50.3	56.0	56.5	56.2	14.4	15.6	15.0	4.3	4.9	4.6	6.1	3.8	7.0	5.4	5.5	5.0	5.3	3.6	8	17	13	16
BERGEN	49.5	70.8	39.8	40.3	50.1	55.2	54.5	54.9	13.5	14.3	13.9	4.6	4.9	4.7	4.2	1.6	4.0	2.8	3.0	3.5	3.3	5.2	21	38	29	59
SONJA	49.7	69.7	39.3	41.2	50.0	55.6	54.4	55.0	13.9	15.3	14.6	4.5	4.8	4.6	4.2	1.5	4.0	2.8	4.1	4.2	4.1	6.2	23	40	31	70
KRONA	47.2	71.9	35.7	43.4	49.6	52.9	53.1	53.0	13.1	14.6	13.8	5.9	6.3	6.1	3.8	1.4	3.0	2.2	4.3	3.8	4.1	3.5	15	20	18	21
GRANDIN	48.5	64.8	41.1	43.6	49.5	57.1	58.2	57.6	14.7	15.6	15.2	3.4	2.8	3.1	6.5	1.9	6.0	4.0	4.8	5.0	4.9	5.0	13	16	15	22
BUTTE 86	50.2	62.8	44.1	40.7	49.5	56.3	57.6	56.9	14.4	15.1	14.8	2.6	2.7	2.7	7.1	2.3	6.0	4.2	4.9	5.2	5.0	3.5	21	14	18	13
DALEN	47.3	66.6	40.2	43.3	49.4	55.7	57.1	56.4	14.3	15.3	14.8	3.2	3.4	3.3	4.3	1.0	5.0	3.0	3.5	4.3	3.9	5.0	19	18	18	25
NORM	46.8	72.3	38.3	39.7	49.3	55.1	53.8	54.4	13.4	14.6	14.0	5.1	6.3	5.7	5.8	2.0	4.0	3.0	4.3	3.2	3.7	4.9	23	50	37	86
2371	44.6	63.9	38.5	46.3	48.3	55.4	56.6	56.0	14.6	15.9	15.2	4.8	5.5	5.2	5.4	1.4	5.0	3.2	4.5	4.0	4.3	4.3	13	16	15	17
VANCE	47.4	68.1	37.5	39.2	48.1	55.0	54.3	54.6	13.9	15.4	14.7	5.5	5.8	5.6	6.2	3.9	4.0	4.0	5.4	5.3	5.4	5.4	22	32	27	42
GUS	45.0	57.6	38.9	36.8	44.6	55.7	55.8	55.7	15.2	17.2	16.2	4.4	5.2	4.8	6.9	3.3	5.0	4.2	5.3	4.7	5.0	5.4	14	21	18	25
LEN	42.0	57.9	33.1	40.4	43.4	55.1	57.4	56.2	14.7	15.9	15.3	5.4	5.3	5.3	6.3	2.1	3.0	2.6	6.6	5.0	5.8	5.8	9	12.8	11	14
Locations	4	3	4	4	15	12	4	16	6	3	9	3	3	6	4	8	1	9	1	3	4	3	1	3	4	4